

Epidemiology, Statistics and Psychosomatic
Committee:
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#285
cf. #220
Activated 6/1/59

TOBACCO INDUSTRY RESEARCH COMMITTEE

150 East 42nd Street New York 17, N.Y.

Application for Research Grant

Date: May 16, 1960

1. Name of Investigator: James G. Miller, M.D., Ph.D.
2. Title: Professor of Psychiatry and Psychology
Director, Mental Health Research Institute
3. Institution & Address: The University of Michigan
Ann Arbor, Michigan
4. Project or Subject: "The Effects of Smoking and Deprivation of Smoking on
Information Processing Ability, Arousal and Autonomic Correlates."
5. Detailed Plan of Procedure:

A study just completed by Srivastva and myself has shown certain positive findings. Light smokers showed significantly less anxiety than either heavy smokers or nonsmokers, but nevertheless heavy smokers carried out behavioral tasks better than light smokers. There were significant differences in autonomic responses, the light smokers having higher Galvanic Skin Response scores under various experimental conditions than the heavy smokers, suggesting that the autonomic nervous systems of light smokers might be more responsive than the heavy smokers'.

We propose to follow up suggested clues in this investigation by a further research. This research would center around a new electronic apparatus recently designed and constructed by us called the IOTA (Information Overload Testing Aid). With this apparatus it is possible to measure the rate at which information can be handled by an individual under various conditions, such as while smoking and while deprived. Furthermore it is possible to alter the monotony in the information to be handled by the subject in order to determine whether in monotonous situations the individual's arousal falls, causing him to make omissions or errors or to delay his responses.

Recent work using information theory mathematics has suggested arousal may be a function of the monotony or variability in a stimulus situation. It is probable that the level of arousal is related to function of the reticular activating system of the nervous system, and may be related to the level of the Galvanic Skin Response.

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The purpose of this research then would be to determine the information processing capacity of individuals while smoking and after prolonged deprivation, as well as their accuracy and efficiency under these conditions. The amount of the monotony in the task would be varied, so that the subject's state of arousal would vary. We would test the hypothesis that while smoking smokers maintain a higher level of arousal, so that there is an increase in their information processing capacity and in their general work effectiveness. We would also test a second hypothesis that this increase in arousal is related to a higher level of Galvanic Skin Response.

Experimental Design: The subjects would be a group of regular heavy smokers. They would be trained to operate the IOTA apparatus and their baseline Galvanic Skin Response would be determined under normal conditions after several hours without smoking. They would then be given a capsule of nicotine or a placebo before undergoing a repetition of the test. The amount of nicotine in the capsule will be so regulated as to provide a definite nicotine effect in smokers of the same order of magnitude and duration as that which would be obtained by smoking a cigarette with deep inhalation. The tests would be given at the appropriate period of time after ingestion of the capsule to assure a peak nicotine effect. If the effect wears off too rapidly, the tests will be given on more than one occasion until they are all completed.

The tests administered on the IOTA apparatus would vary in degree of redundancy or monotony in the stimulus and the amount of monotony in the external environment would also be altered as an independent variable.

Changes in performance and in Galvanic Skin Response under the two conditions, deprivation and smoking, will be computed for each individual and for the group. The significance of the differences in these changes will be tested, using our electronic computer.

6. Budget Plan:	Salaries (including fringe benefits)	6,250
	Expendable Supplies	800
	Computer and computation service	750
	Subject fees	400
	Overhead (33 1/3%)	2,733
	Total	\$10,933

7. Anticipated Duration of Work: Eight months from receipt of grant until completion of the written report.

8. Facilities and Staff Available: Adequate testing space available in the new Mental Health Research Institute in Ann Arbor, Michigan. Electronics engineer and technicians available as necessary to maintain the apparatuses. We have access to an LGP 30 computer. The Principal Investigator will be assisted by several research assistants currently working on other behavioral investigations, including Mr. Kent Marquis.

9. Additional Requirements: None

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10. Additional Information:

This research design is developed after consideration of the findings of our previous study on which we have submitted a report to you entitled "Performance, Personality and Physiological Correlates of Smoking as Related to Stress." The IOTA apparatus is a new model of a device based on previous research by us outlined in the attached reprint "Information Input Overload and Psychopathology." These two recent investigations are part of a continuing program of study of behavioral effects of drugs, alcohol and tobacco.

The check for support of this research should be made payable to the industrial consulting organization through which we work, Behavioral Science Research, Inc., and mailed in care of Dr. James G. Miller, Director, Mental Health Research Institute, The University of Michigan, Ann Arbor, Michigan.

Signature James G. Miller
Director of Project

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